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DEPARTMENT OF PUBLIC INSTRUCTION
State Council of Education
Harrisburg

Rules and Regulations

FOR

Public School Building Construction

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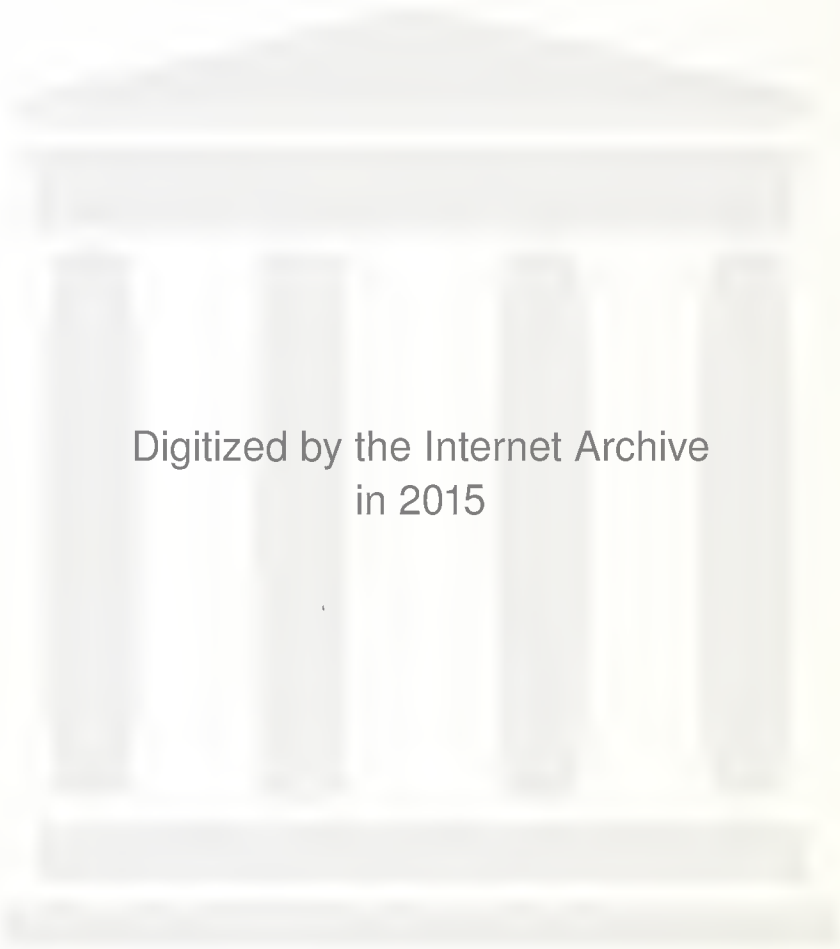

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FOREWORD

In accordance with the authority vested in the State Council of Education by the Administrative Code, Article XIII, Section 1307 (f), and the Act of May 18, 1911, P. L. 309, its amendments and supplements, these rules and regulations have been drafted by the School Buildings Division, approved by the State Council of Education and the Department of Public Instruction.

In accordance with the recommendations of the State Council of Education, I hereby promulgate these rules and regulations.

JAMES N. RULE
Superintendent of Public Instruction

and

Executive Officer of the State Council
of Education

November 1, 1931.

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PENALTY: Article XIII, Section 1302, Administrative Code; School Code, Article XXIX, Section 2904 (j):

> "The Department of Public Instruction shall have the power and its duty shall be: (j) To condemn as unfit for use, on account of insanitary or other improper conditions, any school building, school site, or outbuilding in this Commonwealth, and, upon failure on the part of the board of school directors to remedy such condition, to withhold and declare forfeited all or any part of the annual appropriation apportioned to any such school district."

PETITION: For the modification of any of these rules or regulations the following shall be the method of procedure. Any board of school directors, or other person interested or affected by such rules or regulations may petition for a hearing on the reasonableness of such rules by filing a petition with the Secretary of the State Council of Education at Harrisburg, Pennsylvania, setting forth the rule or regulation upon which a change is desired and the reason for said change.

Upon receipt of a petition the State Council of Education will determine its merits and, if a hearing is necessary, notice of time and place will be given to the petitioner and to such other persons as the State Council may find directly interested.

Copies of all amendments shall be distributed to all architects and secretaries of school boards.

INTRODUCTION

Section I—Administration

These rules and regulations restate the various provisions in the law of Pennsylvania which apply to every public school building in any school district within this commonwealth for all construction, reconstruction, repairs or work of any nature, as enumerated in Article VI of the School Code, and suggest standards and practice for the erection and construction of a school building.

Section II—Scope

All public school buildings are, for classification purposes, divided into two general classes; namely, new construction and existing construction.

New Construction shall mean and include all new buildings and all remodeled buildings where forty (40) percent or more of the remodeled building is new work and when plans for such new or remodeled buildings are submitted after the date of promulgation of these rules and regulations.

Existing Construction shall mean and include all buildings erected or remodeled or for which plans were submitted prior to the date of promulgation of these rules and regulations, or to buildings remodeled after the date of promulgation, provided that less than forty (40) percent of the remodeled building is new work, or to buildings or remodeled buildings, plans for which were submitted prior to the date of promulgation of these rules and regulations.

The *Percent of Remodeling* shall be determined by exterior or interior changes or additions to or alterations of existing outside walls.

Any changes to existing construction, necessitated by any remodeling or repairs, shall conform to the requirements as set forth in Article VI, of the School Code.

Section III—Submission of Plans and Specifications

1. *Legal Requirements*

a. Article VI, Section 615 of the School Code:

"After the organization of the State Council of Education provided for in this Act, no public school buildings shall be contracted for, constructed, or reconstructed in any school district of the second, third, or fourth class, until their plans and specifications have been submitted to the State Council of Education, and any recommendations concerning the same by the State Council of Education have been laid before the Board of School directors."

b. Article VI, Section 616 of the School Code:

"The State Council of Education shall cause to be prepared and shall, at the expense of the Commonwealth, publish and, upon

application, furnish, without charge, to boards of school directors, plans and specifications of different kinds of school buildings, containing not more than four class rooms, suited to the needs of the public schools: Provided, That school buildings may be built according to plans and specifications thus furnished, without submitting the same to the State Council of Education."

Plans and specifications for school buildings not to exceed four school rooms are now available and will be furnished gratis to boards of school directors upon request to the School Buildings Division, Department of Public Instruction.

2. *Procedure*

a. Approval by local boards of school directors.

All final plans or working drawings and specifications must be considered and approved by the local school board for whom they were prepared by endorsement thereon before being submitted to the Department of Public Instruction, School Buildings Division, Harrisburg, Pa. Letter of explanation should accompany all submissions from the local school board or their authorized agent.

b. Preliminary Plans

(1). Before architectural plans are prepared the educational program and accommodations required should be definitely determined by the school board through the local superintendent and in cooperation with the Department of Public Instruction, either by correspondence or a personal interview.

(2). In order to realize most on recommendations made by the State Departments with a minimum of revision to final working plans, four sets of preliminary plans and elevations should be submitted to the Department of Public Instruction, two of which are forwarded to the State Art Commission (May 1, 1919, P. L. 103, Act 79). The submission of preliminary plans is required by the Department of Public Instruction. (See page 9, "Plans Required By Other Departments or Commissions.")

c. Final Plans (Working drawings)

(1). Four sets of final general (architectural) plans and elevations and two sets of general (architectural trades) specifications are required by the Department of Public Instruction for approval and for submission to the State Art Commission for approval of the design, et cetera. All plans and specifications of the mechanical trades (heating, ventilating, plumbing, electric, et cetera) must be submitted in duplicate.

d. Separate Specifications

May 1, 1913, P. L. 155, Act 104 regulates the preparation of specifications; requiring the preparation of separate specifications for the plumbing, heating, ventilating and electrical work for the erection, construction and alteration of any public building when

the entire cost of such work shall exceed one thousand dollars ($1,000.00).

3. *Extent of Approval*

a. Specific project

Approval of a set of plans and specifications is valid only for the specific project mentioned. Every building project requires separate submission and approval of plans and specifications.

b. Time limit

Final approval of plans and specifications is valid for a period of one year only from date of final report, after which a renewal of approval must be secured for work not under contract.

c. Changes after approval

No deviation from plans and specifications covered by Article VI of the School Code shall be made without submission of revised plans and (or) specifications and approval of the same. This requirement covers only specific items of the Law.

d. Factors of safety

(1). *Full Approval* by the State Council of Education, does not cover "Factors of Safety" unless this inspection is requested by the local board of school directors for whom the work is intended or unless stated in the letter of approval.

(2). *General Approval* of plans and specifications by the State Council of Education does not cover character of materials, strength of construction, safety loads of building, and other factors of safety which enter into school building design, construction or equipment. The responsibility of this work is assumed by the architect or engineer and the local school board.

(3). The State Council of Education may withhold the approval of any plan which has not been drawn up in accordance with modern building practice and which in their opinion does not insure safety of construction.

Section IV—Plans Required by Other Departments or Commissions

1. *Department of Labor and Industry*

Article XLVII, Section 4705 of the School Code and the Fire and Panic Act, No. 299 of 1927, require in school buildings not in cities of the first class, second class and second class A, certain construction and ways of egress, equipment, operation and maintenance and provide for the submission of plans for examination and approval by the Department of Labor and Industry. Triplicate plans should be submitted directly to the Building Section, Bureau of Inspection, Department of Labor and Industry, Harrisburg, Pennsylvania, accompanied by a letter of explanation. Specifications shall also be furnished when requested. (See Regulations for Protection from Fire and Panic.)

2. *Department of Health*

Administrative Code, Article XXI, Section 2111.

The Advisory Health Board shall have the power, and its duty shall be to make such reasonable rules and regulations, not contrary to law, as may be deemed by the Board necessary for the prevention of disease, and for the protection of the lives and health of the people of the Commonwealth, and such rules and regulations, when made by the Board, shall become the rules and regulations of the Department. In accordance with the duties imposed upon the Advisory Board, certain rules and regulations have been drafted and promulgated (April 4, 1923), relating to sanitary regulations, sewage disposal, decaying matter, stagnant water, industrial waste and water supply.

The water supply for proposed school buildings and triplicate copies of plans and specifications of the sewage disposal system, accompanied by a letter of explanation, must be approved by the Bureau of Child Health, Department of Health, Harrisburg, Pa. Plans indicating the design, detail construction, and piping system of artificial swimming pools intended for public school use shall be submitted to this Department for inspection to protect the health of the people using the pool.

3. *State Art Commission*

Approved May 1, 1919, P. L. 103, Act 79.

An Act creating a State Art Commission and requiring the approval of the Commission of the design and proposed location of all public monuments, memorials, buildings or other structures, and certain private structures, proposed to be erected anywhere in this Commonwealth other than in cities of the first and second classes.

Plans and elevations of school buildings are sumitted to the Commission for consideration through the Department of Public Instruction as requested hereinbefore in these regulations.

Section V—Information Required on all Plans and (or) Specifications

1. *Title, Revised and Approved Blocks*

a. Name, and location of building (city, borough, or township, and county).

b. Type of school (consolidated, vocational, grade, junior high or senior high).

c. Name of owner (school district).

d. Author's name with true appellation and address (registered architect, professional engineer, et cetera).

e. Branch of work (general, heating and ventilating, plumbing, or electrical).

f. Date of drawings and specifications and date of any revisions thereto.

g. Scale of drawings.

2. *Plot Plan*

Plot plan (drawn to scale) with the scale indicated, show points

of compass, existing buildings, property lines (boundaries), elevations or contours and proposed location of building (block plan) and service mains on the site. Indicate highways, location of service connections and proposed development of property, grading, landscaping, et cetera. Required with architectural plans, only. (See Section I—General Requirements.)

3. *Plans and Elevations*

A plan of each floor and of the roof is required. At least four (4) elevations, one (1) longitudinal section, one (1) cross section, a key to materials and a schedule of finish shall be shown. Definite measurements and details shall be given for partitions, walls, floor areas, width of corridors, stairs, story heights, floor elevations with relation to finish grade, lighting area (clear glass sizes) or window details furnishing this information and indicating height of lower glass line above floor. Indicate swing of all doors, give details of doors, cupboards, cases, trim, et cetera. Show location and size of heating and ventilating flues, amount and location of radiation, et cetera. Show plumbing fixtures, soil lines, size of pipes, connections to soil lines, vent lines and complete drainage system inside of the building together with location of stacks, rain water leaders, et cetera. Indicate location of electrical equipment, switches and outlets, et cetera. Designate all rooms by title and number. Number by floors, consecutively, all rooms, windows, doors and other openings. Show complete dimensions and such other information that is necessary for a clear and definite understanding of all important points bearing upon the plans and necessary to clarify the specifications.

4. *Preliminary Plans*

Preliminary plans for additions and alterations should show the outline of plot, existing building, especially the means of egress and location of windows, and toilet room accommodations and clearly distinguish between existing and proposed work.

5. *Specifications*

Brevity, with complete exact descriptions, clearness of details and fairness of intent are essential. Complete correlation between plans and specifications is desirable.

No patented article or material, nor unpatented article or material, manufactured by a particular firm or individual, nor article or material obtained from a particular locality, shall be specified, unless such specification shall be made simply as a standard, and a clause similar to the following provided in the general or special conditions of the specifications:—

The material (or apparatus) herein specified denotes the standard of quality and capacity desired. Other makes may be quoted on, but bidders must state clearly the proper identifications of the product and the difference in price if another make than the one specified is used.

Section VI—Procedure for Awarding Contracts

School Code, Article VI, Section 617:

"All construction, reconstruction, repairs or work of any nature

including the introduction of heating, ventilating or lighting systems, upon any school building, or upon any school property, made by any school district in this Commonwealth, where the entire cost value or amount of such construction, reconstruction, repairs or work, including labor and material, shall exceed three hundred dollars ($300.00) in school districts other than school districts of the first class, and, in school districts of the first class, where such entire cost value shall exceed six hundred dollars ($600.00), shall be done under contract or contracts, to be entered into by such school district with the lowest responsible bidder, upon proper terms, after due public notice has been given asking for competitive bids: Provided, That if due to an emergency, a school plant or any part of the same become unusable during the school term, competitive bids for repairs or replacement may be solicited from at least three responsible bidders, and, upon the approval of any of these bids by the State Superintendent of Public Instruction, the board of school directors may proceed at once to make the necessary repairs or replacements in accordance with the terms of said approved bid or bids."

Separate Contracts

May 1, 1913, P. L. 155, Act 104, requires the person or persons authorized to enter into contracts for the erection, construction or alteration of public buildings to receive separate bids upon the plumbing, heating, ventilating and electrical work and to award the contract for the same to the lowest responsible bidder for each of said branches when the entire cost of such work shall exceed one thousand dollars ($1,000.00).

1. *Lowest Responsible Bidder*

In determining who is the lowest responsible bidder the school directors must make a sufficient investigation and possess a sufficient reason to intelligently award a contract.

2. *Due Public Notice*

An opinion from the Department of Justice defining "after due public notice" states:

"Advertisements should be inserted in two newspapers published in the community once a week for three weeks."

Supplementing this is an opinion by the Department of Public Instruction which reads as follows:

"Ordinarily a notice consists in advertisements in several newspapers in general circulation in the neighborhood, and by hand bills posted in conspicuous places for a period of at least four weeks; and in case of bids, communications directed to prospective bidders."

3. *Acceptance or Rejection of Bids*

Advertisement and invitation to bidders shall, in each case, specifically state that the school board may reject any or all bids.

4. *Date of Completion*

Common basis for computing bids requires definite date of comple-

tion or time stated in advertisement or specifications within which the building should be completed.

5. *Advertisements*

A "Notice to Contractors" should contain the following essential parts:

Date of preparation or first appearance of notice; request for sealed proposals covering separate parts of work to be done on project; explanation of project and a description of location; definite place, date and time set to receive and open proposals; name and address of person responsible for distribution of plans and specifications and receipt of proposals; statement referring to deposit held as security for safe return of plans and specifications used in bidding and stating conditions under which deposit is returned. Specific reference should be made to amount or percentage of amount of checks required to accompany all proposals; reference to bonds to be furnished by successful contractor by certain date after notification of award and requiring approval of surety company by the board. Definite dates limiting time for starting work and completing contracts must be included. A statement reserving for the School Board the right to reject any or all bids should also appear together with the name of school district and signatures of board members authorized to publish notice which is generally signed by president and secretary of board.

6. *Proposals*

All proposals shall be accompanied by bank draft or certified bank checks in such amounts or percentages of the amounts of the proposals as shall be specified in the advertisement, and shall be publicly opened and declared by the board of school directors and tabulated at the time and place specified in the advertisement, if a quorum of the board of school directors is present or in the absence of a quorum, at the first regular meeting thereafter of the board.

7. *Bonds*

a. Performance Bond

A bidder who shall have accompanied his proposal with a certified or bank check, as aforesaid, and to whom a contract shall have been awarded, must, within ten (10) days after such award, substitute for said check a surety bond for one hundred percentum (100%) of the bid price of the work, as shall have been prescribed by the board of school directors in its invitation for proposals. Such surety bond shall have a surety company authorized to transact business in this Commonwealth.

b. Labor and Material-Men Bond.

School Code, Article LII, Section 5202, (Act of May 19, 1917, P. L. 156) contemplates and stipulates an additional bond for the primary and exclusive benefit of those furnishing labor and material used on such improvements under public contracts. It is a bond for full coverage in addition to

the bond which the contractor gives to the school district to insure the covenants of the contractor and should cover fully all labor and material bills.

School Code, Article VI, Section 617 (Amended May 7, 1929, P. L. 1625; May 29, 1931, Act 103.)

"It shall be the duty of every school district to require any person, copartnership, association, or corporation, entering into a contract with such district for the construction, erection, installation, completion, alteration, repair of or addition to any public work or improvement of any kind whatsoever, where the amount of such contract is in excess of five hundred dollars ($500.00), before commencing work under such contract, to execute and deliver to such school district, in addition to any other bond which may now or hereafter be required by law to be given in connection with such contract, an additional bond for the use of any and every person, copartnership, association, or corporation interested, in a sum not less than fifty per centum (50%) and not more than one hundred per centum (100%) of the contract price, as such school district may prescribe, having as surety thereon one or more surety companies legally authorized to do business in this Commonwealth, conditioned for the prompt payment of all material furnished and labor supplied or performed in the prosecution of the work whether or not the said material or labor enter into and become component parts of the work or improvement contemplated. Such additional bond shall be deposited with and held by the school district for the use of any party interested therein. Every such additional bond shall provide that every person, copartnership, association, or corporation, who whether as sub-contractor or otherwise, has furnished material or supplied or performed labor in the prosecution of the work as above provided, and who has not been paid therefor may sue in assumpsit on said additional bond in the name of the school district for his, their, or its use, and prosecute the same to final judgment for such sum or sums as may be justly due him, them, or it, and have execution thereon: Provided, however, That the school district shall not be liable for the payment of any costs or expenses of any suit."

8. *Workmen's Compensation*

June 2, 1915, P. L. 736, Act 338:

"An Act defining the liability of an employer to pay damages for injuries received by an employe in the course of employment; establishing an elective schedule of compensation; and providing procedure for the determination of liability and compensation thereunder."

a. Requiring contractors to accept Workmen's Compensation July 18, 1917, P. L. 1083, Act 359:

"Provides that all persons contracting with the Commonwealth, or any department or officer thereof, or any municipal corporation, division or subdivision of the Commonwealth, to accept the provisions of the State Workmen's Compensation Act, and to insure the said contractor's liability thereunder, or secure an exemption from insurance in accordance with the terms of the said act in respect to such contract."

9. *Changes after Advertisement*

Plans cannot be changed after advertisement unless revisions are approved by all Departments having jurisdiction.

Bulletins clarifying drawings and specifications, when necessary, shall be issued simultaneously to all bidders not later than three (3) days before bids are received. All such bulletins shall be sent out by registered mail.

10. *Contracts for Public Work*

April 20, 1927, P. L. 350, Act 215:

An Act making it unlawful for any architect or engineer in the employ of the Commonwealth, or any county, municipality, borough, township or other subdivision of the Commonwealth and engaged in the preparation of plans or specifications or estimates, to bid on public work at any letting and also making it unlawful for the officers of any such subdivision of the Commonwealth charged with the duty of letting any public work to award a contract to any such architect or engineer in the employ of the Commonwealth or any subdivision of the Commonwealth.

Not lawful for any achitect or engineer in the employ of the Commonwealth or of any subdivision of the Commonwealth to be in any wise interested in any contract for public work nor receive any remuneration or gratuity from any person interested in such contract; and fixing penalties.

GENERAL REQUIREMENTS

Section I—The School Site

School Code, Article VI, Sections 601 to 614 inclusive, 626, 627, 629 and 631 cover the legal requirements in regard to school sites; authorize school boards to acquire, condemn or dispose of, govern location, maintenance, use and care of, provide for tax exemption and require the display of the National flag.

1. *Location*

a. Accessibility

The center of present, also estimated future population and the geographical center of the school district should be given full consideration. Location may be sacrificed in the interest of adequate site, condition of surface support in mining districts, and environment. Convenience of approach from a public highway, sufficiently removed from the main arteries of traffic, is desirable. Walking distances to city schools should not exceed the following:

Elementary schools ¾ mile
Junior high schools 1½ miles
Senior high schools 2 miles

In rural communities transportation permits enlarging the contributing area to secure more effective school units. Walking distance to consolidated schools shall not exceed one and one-half (1½) miles.

b. *Environment*

Sites in the neighborhood of railroads, crossings, factories, gas plants, and non-fireproof buildings should be avoided. Freedom from noises, dust, smoke and polluted air should be secured.

2. *Drainage*

a. Elevation

A gentle sloping elevation affording natural drainage is desirable. Low swampy ground should be avoided wherever possible. Where the contour of the land permits, the site should be located on high land. Abrupt differences in contour or grade may prove undesirable and furnish difficult problems in building design and playground arrangement.

b. Depressions

Surface drainage from adjacent ground, streets or highways should be avoided.

3. *Nature of Soil*

a. Composition

The soil should be sandy loam which will pack slightly and contain 15 to 25% sand. A site which erodes or contains springs should be avoided. A naturally enriched or fertile soil that will grow trees and shrubs is desirable.

b. Physical properties

Natural ground should be chosen in preference to filled or artificial ground. Contaminated soil and its menace to the physical welfare of the children should be avoided.

c. Condition

Playground area should drain rapidly, be dry and pervious. Hard surfaced construction is not desirable.

4. *Size and Shape*

School Code, Article VI, Section 604 places the responsibility for the location and amount of real estate required for school purposes upon the local board of school directors and provides for proper playgrounds for new school buildings.

a. Determining factors

The site should provide for future development, landscaping possibilities and community needs. A broad rectangular shape is desirable. It should be large enough to allow for the proper frontage length and setting or placing of the building, service areas, lawns and gardens and a playground of adequate area to care for the needs of the school.

b. Size of playgrounds

The following recommended areas for playgrounds are exclusive of the area occupied by the building, service areas, lawns and gardens.

Consolidated Schools

The State Council of Education requires the following areas for consolidated schools and must approve the location of the site. (School Code, Article XXXVII, Section 3705.)

Rural (elementary) sites—2 acres
Urban (elementary) sites—3 to 5 acres
Rural and Urban (high school) sites—5 acres

Rural Districts

Rural (elementary) 4 room mountainous sites—2 acres
Rural (elementary) sites—3 to 5 acres
Small village sites—3 acres

Urban Districts

Town (elementary) sites—5 acres
Town (high school) sites—8 to 10 acres

High Schools

The grounds should be laid out for various athletic activities (baseball, football, hockey, track, tennis, game courts, et cetera) and other activities commensurate with local requirements.

Junior high school sites—10 to 12 acres
Senior high school sites—15 to 25 acres

Junior Colleges

Junior college sites—30 acres and up

5. *Conveniences*

a. Water supply

A safe potable water supply shall be accessible. Provision should be made for washing and bathing facilities and an adequate

toilet system. The volume and pressure of the water supply is very important. Approval of the water supply for proposed school buildings by the Bureau of Child Health, Department of Health, Harrisburg, Pennsylvania, is required.

(See Introduction, Section IV—2.)

b. Sewage disposal

Sewage disposal should be by connection to sanitary sewer if available. Disposal of sewage by septic tank and tile drainage field, or by any method other than sanitary sewer must be approved by the Department of Health. (See Introduction, Section IV—2.)

c. Electricity

Electric service is indispensible to a modern school building.

d. Fire protection

Fire company service should be available and adequate provision made for this service.

6. *Location and Orientation of Building*

a. Relating to boundaries

A building bordering on one or two adjacent sides of the plot provides a maximum of play space, and permits the maximum utilization of playground area. Also allows for a desirable division of the site into sections for play area, service area and public area.

b. Future development

The building should be located with ample foreground to obtain maximum aesthetic effect and permit future additions that will not destroy or seriously invade upon the play area. Its position should be such that a logical arrangement of all the property is obtained, considering the fact that service, recreation and beauty are desired.

c. Adjoining obstructions

The minimum distance between a school building and other structure or a party lot line is thirty (30) feet. The distance separating a school building from obstructing buildings or trees should be not less than twice the vertical height of the building or obstruction. Closed courts within school buildings are not desirable but when their use is imperative their dimensions are governed as above.

d. Orientation

Class rooms should receive maximum sunshine before and after school hours with the least interference by direct sunshine on the desks during school hours. To obtain best condition in our latitude, class rooms should face southeast. Next, in order of preference, are east, southwest, west and south. North light is preferable for studios, and certain other special types of instruction rooms.

7. *Development of Grounds, Landscaping*

School Code, Article VI, Section 626 requires the board of school directors to make and maintain the grounds about a school building in a neat, proper and sanitary condition, and to maintain a proper number of shade trees.

a. Playground equipment

The grounds about every school building should have adequate playground equipment to provide for the local needs. Parking space for automobiles should also be provided.

b. Landscaping

In addition to shade trees, which should be at a distance from the building, additional beautification of the school grounds is recommended in the form of landscape gardening; artistic planting, lawns and gardens. The School Buildings Division, Department of Public Instruction, and the Bureau of Municipalities, Department of Internal Affairs, will cooperate on problems of this nature.

c. United States flag

School Code, Article VI, Section 629 provides for the acquisition of a United States flag, flagstaff, and the necessary appliances therefor, and requires and defines the display of said flag upon or near each public school building.

Provision should be made for a flagstaff about the building on the school ground. It should have the necessary appliances such as halyards, truck, et cetera, complete. A proper base of iron or other suitable material is preferable to simply embedding the pole in the ground. Care should be exercised in proportioning the height of the pole in relation to the height of the building. The diameter of the pole as well as the dimensions of the flag should also be in their proper proportion. A suitable container for the safe keeping of the flag when not in use should be placed in the building within easy access. The flag pole should be included in the building contract.

SECTION II—The School Building

School Code, Article VI, Sections 622, 625, 627, 628, 631, 634 and 635 require fireproof construction, fire escapes, safety appliances, provide for insurance, tax exemption, penalty for damaging or defacing school property, and permit use of buildings for other proper purposes. *School Building* shall mean any building, structure or portion of same which is used as a place for instruction of children who attend school as required by Law.

The following general requirements are supplemental to the legal requirements of the School Code and shall apply to all school buildings—new construction or existing construction as designated.

1. *Classification by Construction*

a. Types of construction

(1). *Fireproof Construction,* a term analogous to fire-resistive construction is hereinafter defined as *Fire-Resistive Construction* to carry out the intent and purpose of the Section.

Fire-Resistive Construction shall mean that all buildings or parts of buildings required to be of fire-resistive construction shall be constructed of such non-inflammable materials as stone, steel, concrete, brick, tile, expanded metal lath with plaster on steel studs when specifically permitted by the regulations, and such other materials as may be approved from time to time.

(2). Classification

For construction purposes school buildings are grouped under four types as follows:

Type A—(Fire-Resistive) a building constructed of fire resistive materials, including roof, windows, doors, floor (subfloor and finish), and all finish.

Type B—(Fire-Resistive) a building of fire-resistive construction in its walls, floors, ceilings and stairways but with wood or composition floor (finish) surface, wood doors and interior finish.

Type C—(Slow Burning Construction) a building with exterior masonry walls but otherwise ordinary or joist construction and wood finish.

Type D—(Ordinary or Frame Construction) a frame building constructed with wood above foundation, in which wood frame work forms the structural supports for enclosure walls, floors and roof.

b. Height Regulations

School Code, Article VI, Section 622 requires in school districts of the first class fireproof construction for all school buildings two or more stories high and in school districts of the second, third or fourth class, fireproof construction for every building more than two stories.

Fire and Panic Act, Section 5, Article 1, Rule 100 (a) group 3 Buildings states, "No school buildings, public, private or sectarian, up to and including high school grade shall exceed two (2) stories in height unless it be of fire resistive construction. For three (3) or four (4) story buildings, the roof shall be of protected construction which shall mean that the entire roof framework shall be of steel construction. Wood planking, if used for sheathing, shall have a nominal thickness of at least two (2) inches and shall be attached by means of wood spiking pieces to the metal framework. The ceiling of the floor next below shall be constructed of metal joists with a minimum of two (2) inches of reinforced concrete slab construction and at least seven-eighths (7/8) inch gypsum or cement plaster on metal or wire lath on the underneath side, or other equivalent construction. The roof covering shall be of incombustible material. Any opening through the concrete slab shall be equipped with fire resistive doors.

"For buildings exceeding four (4) stories the roof shall be of fully protected construction which shall mean that all materials entering into the construction of the roof, the supporting members, and the ceiling of the floor next below, shall be of incombustible material."

(1). Story (Grade Limit)

The term *Story* shall be that part comprised between the upper surface of any floor and the upper surface of the floor or roof next above in that portion of the building above grade, ground or curb level. Where any mezzanine, balcony or gal-

lery shall extend over thirty-three (33) percent or more of the horizontal area within the outer walls of the building, it shall be considered as a story. A garret (attic) or pipe loft shall be considered as a story if the average ceiling height exceeds eight (8) feet and if so constructed as to make occupancy of it possible.

To be classified as a *First Story* the floor level shall be not more than five (5) feet above grade, ground or curb level. In extreme cases where the slope of the land is heavy, the grade adjoining not more than one-third (⅓) of the perimeter of the building may be more than five (5) feet below the first story line without increasing the story classification, provided, however, that the average of the grade line, and the required number of exits are kept within five (5) feet of grade. If the height of the floor level immediately above grade exceeds the above named requirements, it shall be known as the *Second Story* for purposes of story classification.

On petition to the Industrial Board and the Department of Public Instruction, this distance may be increased from five (5) feet to eight (8) feet where excessive slope is encountered, except that exits in all cases shall be within five (5) feet of grade.

(2). Story (Limit)

Where any story height, except auditorium or gynasium with no floors above same, exceeds sixteen (16) feet, that portion of the building shall be considered as constituting two (2) stories for classification purposes, unless governed by mezzanine restrictions as defined above under "Story (Grade Limit)."

e. Construction regulated by height

When any local ordinance or building code shall cause a conflict between the requirements of the different classes, the type of construction requiring the safest form shall govern the entire building.

When any building is not classified or when there is any doubt as to its classification the State Council of Education or its authorized agent shall designate under which class it shall be placed.

(1). Minimum requirements for certain districts

The following requirements govern school buildings erected in school districts of the second, third or fourth class:

(a). When a building is five (5) stories or more in height, Type A (Fire-Resistive) construction is required.

(b). When a building is three (3) stories and not more than four (4) stories in height, Type B (Fire-Resistive) construction is required.

(c). When a building is two (2) stories in height, Type C (Slow Burning Construction) or Type D (Ordinary or Frame Construction) may be used, with exceptions as required by the Department of Labor and Industry under certain conditions.

(d). When a building is one (1) story in height, Type C (Slow Burning Construction) or Type D (Ordinary or Frame Construction) may be used, with exceptions as required by the Department of Labor and Industry under certain conditions.

2. Means of Egress and Circulation (New Construction)

School Code, Artiele VI, Section 625 requires neeessary fire eseapes and safety appliances as required by Law. (Sehool Code, Artiele XLVII, Seetion 4705 and Act 299, April 27, 1927, P. L. 465.)

The following standards are the requirements of the Department of Labor and Industry for the proteetion and safety of persons in educational buildings not in cities of the first class, seeond elass or second elass A. (See Regulations for Proteetion from Fire and Panie—Class I Buildings, Group 3, Article 6.)

a. Computation of occupaney

The means of egress shall be based on the maximum legal eapaeity of eaeh floor of the building, assuming that all rooms (except the auditorium and gymnasium) are oeeupied. The number of oeeupants shall be based on the number of desks or seats that each room is designed to aeeommodate. For rooms where no seats or desks are provided, the number of oecupants of sueh room shall be computed by dividing the square feet of floor area by fifteen (15). The number of oeeupants of the first floor shall be eomputed separately from the number of oecupants of all floors above the first and the required exits shall be computed separately.

(1). The means of egress from elass room floors shall be based on the number of persons on each floor and shall be aeeording to the following tables:

Buildings of Not More Than Two (2) Stories in Height

Capacity			*Required exits*		
			One story buildings	*Multiple story buildings*	
Ordinary construction	*Slow burning construction*	*Fire-resistive construction*	*First floor*	*First floor*	*Floor above the first*
Up to 300	Up to 360	Up to 400	2	3	2
301—450	361—540	401—600	3	4	3
Add one exit for each 100 persons over 450.	Add one exit for each 180 persons over 540.	Add one exit for eaeh 200 persons over 600.			

Buildings More Than Two (2) Stories in Height

Capacity	*Required exits*	
Fire-resistive buildings	*First floor*	*Floors above the first*
Up to 250	3	2
251—500	4	3
Add one exit for eaeh 300 persons over 500.		

(2). In school buildings eontaining an auditorium or gymnasium or both, the exit requirements for the auditorium or

gymnasium or both shall be computed separately. If the same corridors and outside exits are used as required exits for both auditorium and classrooms, the number of outside exits shall be based on that portion of the building requiring the greater number of exits.

Where two (2) classrooms are combined and separated by folding or rolling doors, such a combination of rooms shall not be considered as within the provisions of this paragraph, but two (2) five (5) feet doors shall be provided, one leading directly from each room.

The auditorium shall not be placed above the first floor level nor below the grade level.

The minimum number of exits to be provided from any auditorium or gymnasium having the exits from the main floor not over one step of eight (8) inches above the grade shall be as follows:

Capacity			
Fire-resistive buildings	*Non-fire-resistive buildings*	*Number of exits required*	*Location of exits*
Up to 100	Up to 100	2	1 front—1 rear
101—400	101—350	3	2 front—1 rear
401—600	351—500	4	2 front—2 rear
Add one exit for each 250 persons or fraction thereof over 600.	Add one exit for each 200 persons or fraction thereof over 500.	Subject to approval	

The minimum number of exits to be provided for any auditorium with exits from main floor over one step of eight inches above grade or from any gymnasium with exits from the main floor over one step of eight inches above or below grade shall be as follows:

Capacity			
Fire-resistive buildings	*Non-fire-resistive buildings*	*Number of exits required*	*Location of exits*
Up to 100	Up to 100	2	1 front—1 rear
101—300	101—250	3	2 front—1 rear
301—500	251—400	4	2 front—2 rear
Add one exit for each 250 persons or fraction thereof over 500.	Add one exit for each 200 persons or fraction thereof over 400.	Subject to approval	

(3). The minimum number of exits to be provided for balconies of auditoriums or gymnasiums shall be as follows:

Capacity			
Fire-resistive buildings	*Slow burning construction buildings*	*Number of exits required*	*Location of exits*
Up to 100	Up to 100	2	As widely separated as possible and subject to approval.
101—250	101—200	3	
251—500	201—400	4	
Add one exit for each 250 persons or fraction thereof over 500.	Add one exit for each 200 persons or fraction thereof over 400.		

Balconies are not permitted in buildings of frame or ordinary construction.

(4). The required means of egress from the first floor or floors above the first and the required means of egress from the main floor of the auditorium or gymnasium and from the balcony of the auditorium or gymnasium may be the same exits provided the auditorium or gymnasium and the school rooms are not used to their maximum capacity at one time.

If the auditorium or gymnasium or both are separated from the other portion of the building and the same exits or halls are not used by both portions of the building, the exit requirements for each portion of the building shall be computed separately, and so applied.

b. Stairways

All stairs used as required means of egress shall be constructed as smokeproof stairs, that is, the stairs cut off from the corridors or passageways by smoke-proof barriers. Enclosed closets under stairs are not permitted.

All stairways used as means of egress shall have direct exit to the outside as near the grade level as practicable. Winding (geometrical) stairs are not permitted as required means of egress.

(1). Construction

One required means of egress shall be a stair tower of fire-resistive construction entirely separated from the rest of the building by walls of brick, tile or concrete or metal covered partitions with wire glass on the corridor side. In frame construction this stair tower may consist of wood studs with metal lath and cement or gypsum plaster on both sides and fire stops at top, bottom and center of the studs. If more than two means of egress are required from floors above the first, the Department of Labor and Industry may require that more than one of the required stairs be in the form of a stair tower of fire-resistive construction.

A stair tower of *Fire-Resistive Construction* shall consist of stairs of slate, iron, concrete or other approved fire-resistive materials enclosed within walls of brick, tile, concrete or other approved fire-resistive materials where specifically permitted by the regulations and shall be well constructed of good materials and good workmanship.

(2). Location.

All means of egress shall be as remote from each other as possible. The maximum travel from the corridor exit of every room to the nearest exit shall not exceed one hundred (100) feet.

Horizontal exits may be permitted in lieu of stairs but not to exceed fifty (50) percent of the required number of exits.

(3). Design

Stairways should be sound-proof, simple in design, have closed risers, sanitary coves and be free from dust-catching corners, ledges, mouldings, etc. All stairs used as means of egress shall be not less than forty-eight (48) inches in width in the clear except that stairs in buildings of not more than two (2) stories in height; this width may be reduced to not less than forty-four (44) inches. The required width of stairs shall be maintained for the entire length of the stairs at all points. No stairway shall be of less width than the stairway in the story above.

Stair wells shall not exceed fifteen (15) inches in width except for monumental stair construction. All stairs used as means of egress shall have a minimum pitch (rake) of not less than thirty (30) degrees and a maximum pitch (rake) of not greater than thirty-three (33) degrees and the height of the riser plus the width of the tread (run) shall not exceed eighteen (18) inches, exclusive of nosing. Landings shall be required between smoke barriers and the top of stairs. Two runs of stairs (half-turn, newel) shall be provided between all floors, and landings shall be located not more than fifteen (15) risers from either floor and where possible not more than thirteen (13). All landings shall be at least as wide as the stairs at all points in the clear. No door shall encroach upon the required width of the landings.

The wall at the outer corners of landings should be curved on a radius of at least two (2) feet or forty-five (45) degree splay not less than twenty (20) inches wide shall be provided to eliminate right angle corners.

Handrails shall be required on both sides of all stairs. Stairs over eight (8) feet in width shall have a center rail supported by standards not over six (6) feet apart. Handrails shall be securely fastened to the walls and shall be not more than three (3) inches or less than two (2) inches from the walls.

(4). Monumental and service stairs.

Monumental, secondary or service inside stairways may be placed in buildings of fire-resistive construction but shall not count as means of egress. All such stairs shall be enclosed at the top with smokeproof barriers.

(5). Outside stairs

Outside stairs necessary to reach grade level shall be constructed as follows: Stairs shall be at least as wide as the total width of the exits they are meant to serve. The pitch (rake) shall not exceed thirty-three (33) degrees. Landings shall be provided outside the exterior door of a width at least equal to the width of the door. No run of stairs shall exceed

ten (10) steps without an intermediate landing. Handrails shall be provided as for interior stairs.

(6). Lighting

Provision should be made for adequate artificial as well as natural lighting. Electric key switches (three way type) should be placed near the exits. Emergency exit lighting system in accordance with the *Regulations for Emergency Lighting Systems.*

(7). Ramps

Ramps may be used in lieu of stairs to make up differences in floor levels, grades, et cetera. Ramps, when used, shall have a slope of not greater than one (1) foot in ten (10) feet (10%). Ramps shall not end, top or bottom, in a step unless a landing at least sixteen (16) inches wide is provided. Ramps shall comply with all requirements for stairways (construction, width, enclosure, rails, landings, lighting, etc.) insofar as applicable. Ramps shall be surfaced with a suitable non-slip and non-trip material wherever surface is such to involve danger of slipping or tripping. Where ramps have a slope of less than one (1) foot in twelve (12) feet (8 1/3%), handrails shall not be required. Landings shall not be required for such ramps.

c. Corridors

(1). Design features

The position of class rooms and special rooms, etc., determines the corridor location. Class rooms, etc., must be accessible direct from the corridor. They should be arranged to provide easy access to stairways and exits and permit rapid circulation to every portion of the building. Adequate natural and artificial lighting should be provided. Direct outside light and air are desirable; artificial light should not be required under ordinary conditions. Recesses for radiators, drinking fountains, lockers, cases, pedestals, etc., are desirable. Sanitary cove base, a durable wainscot, plain mouldings free from dust-catching corners and ledges should be used when possible. Ceilings may be furred down below other ceilings.

(2). Width

The minimum width of main corridors shall be determined by the number of classrooms facing on the corridor. This width shall be according to the following table:

Number of Classrooms	*Minimum Width of Corridors*
6 rooms or less, frame construction	8 feet
8 rooms or less, slow burning construction	8 feet
10 rooms or less, fire-resistive construction	8 feet

For each additional two (2) rooms in frame construction, four (4) rooms in slow burning construction, or six (6) rooms in fire-resistive construction, the minimum width of corridors shall be increased by one (1) foot.

The required width of corridors shall be clear of obstruction.

Secondary passageways shall be not less than five (5) feet wide in the clear.

Where it is intended to add to the building at a later date, the corridor shall be designed to take care of the increased capacity for future additions without alterations.

When lockers are placed in corridors, minimum corridor widths shall be increased one (1) foot for a row of lockers placed on one side of a corridor and two (2) feet in width when lockers are placed on both sides of a corridor.

d. Doors

School Code, Article VI, Sections 623 and 624 require all entrance doors in any school building now in use to open outward. In all new buildings or buildings leased or used for school purposes all doors of entrance and exit, as well as leading to or from all regular, special or general rooms, must open outward. (See definition of *School Room*, page 34, and "Fireproofing" regulations for Protection from Fire and Panic.)

(1). Class room

Doors to class or instruction rooms should swing on the jamb nearer the front of the room. Glass panels when used shall not exceed two hundred and eighty (280) square inches in area (each light). Transoms are not desirable.

(2). **Exit**

All exit doors from the auditorium or gymnasium, all exit doors giving access to the stair tower, and all exit doors to the outside shall be not less than five (5) feet or more than six (6) feet wide in the clear. In lieu of the five (5) feet outside exit doors, two (2) three (3) feet doors may be substituted. The mullions between the two doors shall not exceed six (6) inches in width.

All outside exit doors shall swing outward and be equipped with approved panic locks. All auditorium or gymnasium exit doors shall swing outward and be equipped with panic locks or shall have no latches or locks whatsoever. All vestibule doors and entrance doors to stair towers from corridors shall swing outward without any locks or latches unless panic bolts are used.

(3). Fire-resistive

All doors, sash and trim giving access to a stair tower of fire-resistive construction, except exit doors at grade level and entrance door on the top floor, shall be all metal or kalamein doors. If glass is used, it shall be wire glass and no single pane shall be a size greater than two hundred and eighty (280) square inches.

(4). Self-closing

Doors used at entrance to stair towers of fire-resistive construction, or doors used as smoke barriers or fire barriers in halls or between parts of buildings separated by a fire wall or between adjoining buildings, shall be self-closing or double acting doors and if glass is used it shall be wire glass and no single pane shall be of a size greater than two hundred and eighty (280) square inches. Doors used as fire barriers shall be of approval fire-resistive construction.

e. Windows (Fire-resistive)

If windows are placed in the stair tower they shall be of metal sash and wire glass and no single pane shall be of a size greater than two hundred and eighty (280) square inches. This shall not apply to windows on the street side of stair towers where there are no other buildings or parts of buildings or similar exposures within fifteen (15) feet.

f. Openings on to porch type means of egress

If the fire-resistive porch type means of egress is used, all doors and windows opening on to such porch shall be of fire-resistive construction, except doors and windows on the top floor and doors and windows more than four (4) feet away from the stairs. Doors shall be all metal or kalamein and sash shall be of metal, or, tin clad doors and tin clad window sash and frames may be used provided all wooden parts are covered on the inside. Tin shall be double lap seamed and made without solder. Wire glass, if used, shall have no single pane greater in size than two hundred and eighty (280) square inches.

3. *Means of Egress* (Existing Construction)

School Code, Article VI, Section 625 requires necessary fire escapes and safety appliances as required by Law. (See School Code, Article XLVII (4705) Sections 1 to 15 inclusive.)

The following standards are the requirements of the Department of Labor and Industry for educational buildings not in cities of the first class, second class or second class A. (See Regulations for Protection from Fire and Panic—Class I buildings, Group 3, Article 7.)

a. Number required

In all schools or colleges or other buildings used for educational purposes of more than one (1) story in height there shall be provided at least two means of egress from all floors of the building.

No school shall be used for other than school purposes after darkness where more than fifty (50) persons are assembled unless at least two (2) means of egress are provided. This requirement to include single room, one story buildings. If, in the opinion of the Department of Labor and Industry, two (2) means of egress are not sufficient to provide for the safety of those assembled in the building, additional means of egress shall be provided. If additional means of egress are required from floors above the first, the additional means of egress shall, upon the approval of the Department of Labor and Industry, be either a stair tower of fire-resistive construction, or an iron fire escape erected according to specifications approved by said Department, or an internal stairs with side walls of metal lath and cement or gypsum plaster with the underneath side (soffit) of the stairs treated with metal lath and cement or gypsum plaster. If additional means of egress are required from the first floor the means of egress shall be by doors at floor level with the necessary steps or ramps at grade.

b. Stairways

(1). Width

If designed for a total building occupancy of fifty (50) or more persons, the additional means of egress shall be not less than forty-eight (48) inches in width, except when the additional means of egress is a fire escape and the condition of the walls makes this impossible, in which case the width shall be determined by the Department of Labor and Industry.

If designed for a total building occupancy of less than fifty (50) persons, the additional means of egress shall be not less than thirty-six (36) inches in width if the means of egress is a stair tower or an internal stairs, and not less than twenty-four (24) inches in width if the means of egress is a fire escape.

(2). Location

The fire escape or other means of egress shall be so located that the occupants of any room need not pass another stairway or exit to reach it, unless the stairway is entirely enclosed.

Access to the fire escape or other means of egress shall be from a public hall (corridor) or from each room, or from one room provided other rooms have direct access to it.

(3). Handrails

At least one handrail shall be provided on all stairs less than forty-eight (48) inches in width, and for stairs forty-eight inches or more in width, handrails shall be provided on both sides of stairway. Handrails shall be securely fastened to the wall and at least three (3) inches from the wall.

(4). Lighting

All stairs, public halls and corridors shall be adequately lighted, either naturally or artificially and lights shall be kept burning in all halls and stairs during periods of darkness or at night when the building is occupied.

(5). Obstructions

All fire escapes and all stairs and halls shall be kept free from obstructions and ready for instant use at all times.

(6). Fire escapes

Counterbalanced types of fire escapes shall not be permitted except in cases where fixed terminal types cannot be used and when approved by the Department of Labor and Industry.

c. Doors

All means of access to the fire escape or other means of egress shall be by means of a door at floor level. Doors shall be not less than five (5) feet in width if intended as means of egress for fifty (50) or more and not less than three (3) feet wide if intended as means of egress for less than fifty (50) persons. Doors shall open outward but shall not obstruct the passageway of other exits or from floors above. All such doors shall be equipped with approved panic bolts.

All doors giving access to or passed by a fire escape shall be fire-proofed. A tin clad wooden door is acceptable, providing it is tinned on the inside and tin is double lap seamed and made without solder. If glass is used it shall be wire glass with no single pane greater in size than two hundred and eighty (280) square inches.

The only exceptions to the above are that doors more than four

(4) feet away from the fire escape or doors on the top floor of the building giving access to the fire escape need not be fireproofed.

d. Windows

All windows, passed by, under, or over a fire escape, shall be of wire glass, except that windows under one or more of the following conditions need not contain wire glass:

(1). Windows passed by the fire escape where the escape is more than four (4) feet away.

(2). Windows under a fire escape where the window is more than one (1) full story below the nearest part of the fire escape.

(3). Windows over a fire escape where the vertical distance from the center of the window sill to the tread of the fire escape is more than five (5) feet.

4. *Recommendations*

a. Plan

The building should be so planned that future additions will not interfere with the natural lighting of the rooms. The plan should be elastic and permit freedom of expansion of any one of its departments with minor adjustments. Open types of plan such as I, C, U, E, ⊟ H or similar shapes, are most desirable. The arrangement of rooms should be determined by the organization and type of school to be housed.

b. Exterior

Pleasing aesthetic effect is desirable. Variance of construction features adding to appearance more desired than those adding to cost.

Superfluous ornamentation at expense of utility should be avoided.

c. Entrances

Located at most convenient approaches to building. Direct access to playgrounds, auditorium, gymnasium, playrooms, kindergarten, shop, heating plants and stairways are desirable. Freedom of outside obstruction is required. Steps few as possible and enclosed within building. Vestibules are desirable, especially at public entrance to auditorium, and floors of durable water-proof construction are recommended.

d. General

(1). Height

School buildings should not be over two (2) stories in height except in congested districts where the cost of site precludes expansion. Small buildings not exceeding twelve (12) rooms should be one (1) story. The one (1) story building has several advantages some of which include minimum of fire and panic hazards; simplifying of supervision and administration; economical construction; quick to build; elasticity of plan permits adjustments in rooms and permits future extension very readily.

(2). Basements

Basements should be used only for heating plants, janitor's room, bicycle storage, storage and similar service. Waste space

and excessive storage rooms should be avoided. The entire basement when provided, should be utilized to justify its existence.

Foundation walls exposed in any excavated part should be made waterproof and dampproof. Unexcavated basements should be left open for ventilation and floors above insulated against heat losses.

(3). Attic space

The space between the roof and ceiling is intended as a means of insulation to prevent excessive heat loss and against cold, and is used only for access to service pipes, et cetera. It should not be used for storage and a minimum of clearance should be provided. Means of access should be provided from the floor below in a convenient location.

(4). Maintenance

Careful attention should be given to maintain the building in a clean, sanitary condition at all times, special attention is directed to condition of toilet rooms, boiler rooms, fuel storage rooms, and storage rooms. All parts of building exposed to dirt and dust should be cleaned frequently. Woodwork and metal work should be kept painted and periodic inspections made of the condition and repair of all masonry work.

5. *Special Requirements* (New Construction and Existing Construction)

The Department of Labor and Industry may require smoke barriers or fire barriers or fire walls to be erected and may require fireproofing of passageways, halls and of closets under stairs or other fireproofing not specified if in the opinion of that Department such fireproofing is necessary to the reasonable safety of the persons employed, lodged or assembled in the building.

The Department of Labor and Industry may require fireproofing of windows in rooms or halls in addition to stair towers to eliminate the hazard of fire from adjacent or adjoining buildings. (Regulations for Protection from Fire and Panic, "Fireproofing.")

a. Building over a garage

No part of any building hereafter erected and intended for use as a school, shall be used as a garage or for the storage of inflammable or explosive oils, except where the garage portion or the portion used for the storage of explosive or inflammable oils is surrounded by fire walls of brick, tile, stone or concrete. Such walls shall be at least six (6) inches in thickness when of solid concrete and eight (8) inches in thickness when of other approved fire-resistive construction. The ceiling of such compartment shall be of reinforced concrete at least four (4) inches in thickness. There shall be no direct opening from such garage or oil storage compartment into any other part of the building located above the garage or oil storage compartment.

Doors may be provided between the garage or oil storage compartment and other parts of the same floor of the building provided that they are of the approved automatic, self-closing, fire-

resistive type. All doors and windows opening from such garage or oil storage compartment shall be of fire-resistive construction, consisting of metal frame and sash and wire glass.

b. Oil supply tanks, gasoline engines, etc.

The main supply tank of oil burning heating equipment and gasoline engine operated emergency lighting device shall be located outside of the building, or if in the building, it shall be buried at least two (2) feet underground or located within a fireproof enclosure of at least twelve (12) inches in thickness; six (6) inches shall be of sand solidly tamped and six (6) inches shall be concrete. The sand shall be between the tank and the enclosure. The fuel tank shall be located at least fifteen (15) feet away from the heating plant, two (2) feet from all foundation footings, and shall be filled from outside the building.

Where the supply tank is more than three thousand (3000) gallons capacity, a permit shall be secured from the Bureau of Fire Protection, Pennsylvania State Police, Harrisburg, Pa., before the tank may be installed.

c. Heating Equipment

(1). New construction

a. The heating plant shall be entirely enclosed in a room constructed of approved fire-resistive walls. The ceiling shall be constructed in accordance with one of the following methods: a four (4) inch concrete slab ceiling, or a combination of steel and concrete measuring four (4) inches from top to bottom, or a combination of steel joists and metal lath with cement or gypsum plaster measuring four (4) inches from top to bottom, or hollow tile construction, but in all cases the steel or metal lath shall be covered by at least one (1) inch of concrete or cement or gypsum plaster on the underneath side. All doors giving access to this room shall be self-closing fire-resistive doors, except where the entrance is from outside the building. Tin clad doors are permitted provided such doors are tinned on the inside, the tin is double lap seamed and made without solder. Air vents may be employed, provided they lead direct to the outside of the building. Ashes removed from the furnace shall remain in this compartment until removed from the building or shall be kept in metal containers. None of the foregoing regulations shall be meant to apply to gas fired furnaces or hot water supply heaters.

b. The walls of all chimneys, except chimneys of high pressure boilers, shall have a flue lining of one of the following materials.

(1). Flue lining shall be of fire clay in standard units, of a minimum thickness of five-eighths (5/8) inch, laid with portland cement joints. The chimney walls shall be built of brick of not less than three and three-quarters (3¾) inches thick (width of a standard brick) or of masonry or concrete blocks at least eight (8) inches in thickness. The chimney wall shall be laid around the flue lining as the chimney is built.

Flue linings shall not be dropped or lowered into plaee after the ehimney is built.

(2). Suitable fire brick of a minimum thickness of four (4) inehes shall be used as a lining for the ehimney. Fire brick shall be laid in fire clay mortar.

No opening shall be eut into the flue lining after it is onee in place. No wood studding, furring, lathing, joists or other wood eonstruction shall project into the chimney or be supported by it. Where the chimney eontains more than one flue opening, they shall be separated by at least four (4) inches of masonry eonstruetion.

(2). Existing eonstruetion

The room eontaining the heating equipment shall be fireproofed as follows:

a. If the building is being altered or remodeled and the heating equipment is being placed in the new or remodeled portion of the building, it shall be treated as speeified in the paragraph on *New Construction.*

b. If the heating equipment remains in its original loeation after alterations are completed, the ceiling above the heating equipment shall be covered with metal lath and eement or gypsum plaster to a depth of one (1) ineh, or other material of equal fire-resistive quality may be used. Ashes removed from the furnace shall be kept in metal eontainers.

6. *Insurance*

All school buildings, furnishings and equipment old and new should be evaluated by a eompetent appraiser and the appraisal entered on the reeords of the Board. Sound business praetiee dictates that all property be adequately proteeted by insurance against loss or damage by fire or otherwise. The School Code gives all boards of sehool direetors in every school distriet the power and authority to make and enter into any contract it may deem proper to insure the buildings or other property of the school district. (See Sehool Code, Artiele VI, Seetions 634 and 635.)

7. *Tax Exemption*

School Code, Article VI, Section 631:

"All sehool property owned by any school district, real and personal, that is occupied and used by any school district for public school, reereation, or any other purposes provided for by this act, shall be, and hereby is, made exempt from every kind of State, eounty, eity, borough, township, or other tax, as well as from all costs or expense for paving, curbing, sidewalks, sewers, or other municipal improvements: Provided, That any sehool district may make any munieipal improvement, in any street on whieh its school property abuts, or may contribute any sum toward the cost thereof." (See Sehool Code, Article XXXIII, Seetion 3333.)

8. *Damaging or Defacing School Property*

School Code, Article VI, Section 628:

"If any person shall wilfully or maliciously break into, enter, de-

face, or write, mark, or place any obscene or improper matter upon any public school building, or other building used for school purposes, or other purposes, provided for in this act, or any outhouse used in connection therewith; or shall deface, injure, damage, or destroy any school furniture, books, papers, maps, charts, apparatus, or other property contained in any public school building, or other building used and occupied for school purposes, or other purposes provided for in this act; or shall injure, damage or destroy any shade tree, shrubbery, fences, or any other property of any kind, upon any public school grounds or upon any public school play-ground, such person shall be guilty of a misdemeanor, and upon conviction thereof shall be sentenced to pay a fine of not less than five dollars ($5.00) and not more than two hundred dollars ($200.00), or undergo an imprisonment in the county jail for a period not exceeding six months, either or both, at the discretion of the court."

9. *Use of Grounds and Buildings*

School Code, Article VI, Section 627:

"The board of school directors of any district may permit the use of its school grounds and buildings for social, recreation, and other proper purposes, under such rules and regulations as the board may adopt, and shall make such arrangements with any city, borough, or township authorities for the improvement, care, protection, and maintenance of school buildings and grounds for school, park, play, or other recreation purposes, as it may see proper, and any board of school directors may make such arrangements as it may see proper with any officials or individuals for the temporary use of school property for schools, playgrounds, social, recreation, or other proper educational purposes, primaries and elections."

Section III—The School Room

School Code, Article VI, Section 618 requires every school room in all school buildings hereafter built or rebuilt to have a total light area of at least twenty percent (20%) of the floor area and prohibits such light to be admitted from the front of seated pupils. A minimum of fifteen (15) square feet of floor space and not less than two hundred (200) cubic feet of air space must be provided for each pupil.

School Room shall mean any space appropriated or set apart as a place of instruction in any branch of knowledge which contains ninety (90) square feet or more of floor area and is to be occupied by six (6) pupils or more under the supervision of an instructor. This definition shall not apply to houses used for home economics practice work.

Light Area—The unobstructed area of the medium or substance which is the source or through which natural light is transmitted; e. g., one of the compartments of a window made by a muntin or muntins. Light area shall mean the free glass area or net area after deductions have been made for all area occupied by frame, sash, mullions, muntins, etc.

1. *Regular Room or Class Room*

a. Principles of design

(1). Area

Floor area is determined by pupil capacity desired, and arrangement and size of equipment to be installed.

Fifteen (15) square feet per pupil is the minimum required area. A broad rectangular shape is desirable, ranging between a minimum width of twenty-one (21) feet and a maximum of twenty-four (24) feet, with length adjusted according to local needs. The distance from the front line of desks or other equipment to the front wall should not be less than eight (8) feet. Forty (40) pupils are considered the maximum and thirty-five (35) pupils recommended for one elementary teacher and thirty-five (35) as the maximum and thirty (30) recommended for one section in a high school organization.

(2). Minimum height

Ceiling heights are determined by pupil capacity desired, light area required, and purpose or use for which room is intended. The minimum required air space for each pupil is two hundred (200) cubic feet. Economical design and practical experience have proven a twelve (12) feet minimum height a very satisfactory standard for school room purposes. (Use of sub-standard emergency accommodations must receive specific approval of the Department.) The breadth is limited according to the height of the ceiling.

(3). Natural illumination required

The light area must equal at least twenty (20) percent or one-fifth of the floor space. Windows on the long axis of the room, one side only, (unilateral lighting) left of pupils, are the most desirable. Windows located on one side (long axis) and rear (one short side), (bilateral lighting) used occasionally, restrict plan and arrangement. When bilateral lighting is used, light area should be increased to twenty-five (25) percent or one-fourth of the floor area. Cross-lighting (opposite sides) and light from front of seated pupils are not permitted.

(4). Location

Orient rooms to receive best lighting conditions, avoid obstructions and reflecting surfaces. It is important that direct easy access be obtained to exits and stairways. Convenient location with reference to general and special rooms is desirable. In school buildings the circulation of pupils within the building, from room to room and from one department to another, is very important and careful consideration should be given this phase of the problem. Ease in circulation will assist in the supervision and administration of the school plant.

b. Construction features

(1). Walls and ceilings

Full consideration should be given to minimize the infiltration of noise from outside sources by providing sound deaden-

ing and acoustical treatments when necessary. Non-gloss plaster surface, with cement plaster dado is the standard finish. Recesses, pilasters, projections, et cetera should be avoided, all walls and ceilings should be straight and free from projections. Wood wainscot is not permitted. Fixed transoms in wall over blackboards, wardrobes, et cetera supplement corridor lighting.

(2). Windows

Placed on one side of room to light desks from left side of pupil. Rectangular openings, square heads located as close to the ceilings as possible. Lower glass line forty inches (3′ 4″) from finish floor. The width of mullions, columns or piers between windows not to exceed one half (½) the width of glass between such obstructions. Extend windows as near to the rear wall of rooms as possible, provide blank or dead wall space near front wall. A minimum distance of four (4) feet is recommended. Curved head windows and transoms are not approved unless the area of the segment or transom is in excess of the minimum glass area required. Clear, plain glass is the standard, small lights recommended. Wide window sills of hard, durable material are desirable.

(3). Areas

The dimensions of the sunken space or court used as means of ingress or egress, or affording light to the basement of a school building, shall be determined in the following manner.

When necessary to form means of ingress or egress the width of area shall be determined by the number and width of the means of egress from the building to the area. In no case shall the width of the area be less than five (5) feet for one (1) exit and it shall be increased one (1) foot in width for each additional exit.

Steps or ramps shall be used leading to grade as required, and the space shall be protected by placing a substantial guard or pipe railing around the top not less than two feet six inches (2′ 6″) high. Gratings shall not be used. The floor of the area shall be provided with a satisfactory means of drainage connected to the storm water drainage system or to drain tiles connecting to any land drainage system.

When required to afford light to school rooms, special rooms, et cetera, the width of the area shall be determined by the distance from the sill line of the window or windows to the finished grade line. In no case shall the width of the area be less than twice this distance or less than an angle of forty-five degrees from the sill line to the top of the area in rooms used for other purposes. All such areas shall be protected and drained as above specified for areas forming means of ingress or egress.

(4). Skylights

When side lighting is insufficient or must be supplemented by overhead lighting, it should be of the monitor or saw-tooth type construction. Diffusing sash are desirable, they should be drained for carrying off moisture and made accessible for cleaning purposes. The light area of skylights and diffusing sash

shall be twice the area required for side lighting. Light divisions shall be small and wire glass shall be used.

(5). Doors

Three feet by seven feet minimum standard size with glass area in upper portion. Located near front of room in close proximity of teacher's desk, side wall of room preferable. Center of door a minimum of five (5) feet six (6) inches from front wall or teacher's end of room recommended. Thresholds when changing from one type of floor surface to another with a slight projection, only. Locks of cylinder or bitted key type, master keyed to other door locks within rooms are recommended. Open outward, hung on jamb nearer front of room. Transoms when used should be large, fixed and contain glass in small divisions. No glass panel of door or transom shall have an area in excess of two hundred and eighty (280) square inches.

(6). Floors

A good hardwood floor is desirable. Maple flooring is recommended. The floor should be free of cracks, checks, splinters, loose boards or projecting ends. Soft woods will not stand the wear. Hard surface material, linoleum, composition and floors which are not dust retaining, damp-proof, sound proof, resilient, well-joined, easily cleaned and durable are satisfactory. Platforms, raised steps, et cetera are not desirable.

c. Accessories

(1). Blackboards

A natural high grade slate free from ribbons and other defects, properly finished (dull) and firmly mounted is the standard. Substitutes are only temporary measures. Blackboards shall not be placed beneath a window or between two windows, it is preferable not to place them on the window side of rooms. Blackboards should not extend into the corners of the room; this space should be used for bulletin boards or display panels. Front and wall on right side of seated pupils, best locations. Each school room should have not less than thirty (30) or thirty-five (35) lineal feet of blackboard; one (1) lineal foot per pupil is recommended.

Tacking or pinning space is desirable above the blackboard, cork, linoleum or similar material are satisfactory, fifteen (15) inches width recommended. Chalk rails or troughs are required at base of all blackboards. Casing, mouldings, et cetera of simple design and sanitary qualities.

The following table indicates the height of blackboard and chalk rail for the various grades:

Grade	*Height of Chalk Rail above Finish Floor*	*Minimum Height of Black Board above Chalk Rail*
Kindergarten	1′ 9″	3′ 0″
First and Second	2′ 0″	3′ 0″
Third and Fourth	2′ 3″	3′ 0″
Fifth and Sixth	2′ 6″	3′ 6″
Seventh, Eighth & Ninth ..	2′ 8″ to 3′ 0″	3′ 6″
Tenth, Eleventh & Twelfth	3′ 0″ to 3′ 6″	3′ 6″ to 3′ 0″

(2). Bulletin board or display panels

Adequate facilities of this type should be provided separate from the blackboards in space not occupied by blackboards. Locations near the door to the corridor are commendable. Cork or other similar material are acceptable. A mounting similar to the blackboards, with omission of chalk rail is satisfactory.

Facilities of this type should also be provided in appropriate locations in the corridors.

(3). Closets, cases, et cetera

Each room should be provided with a teacher's closet, large enough to provide for top clothing, storage of supplies, books, maps and other similar equipment. Book cases, wardrobes when used, closets, and lockers et cetera should be built-in and walls over furred out to eliminate all offsets and recesses.

(4). Interior finish

Picture moulding (metal or wood) is required in all school rooms and should be used in corridors. All wood used for mouldings, casings, trim, chair rails, base, sills, et cetera can be partly stock and made simple in design. Wood wainscot is not sanitary which precludes its use in school buildings. Wood trim should be used sparsely, ornate mouldings and dust catching ledges should be avoided.

(5). Shades

Light, translucent shades should be provided for all school room windows. Two sets to each window opening and double rollers placed at the center in a fixed position. They should be adjustable, sufficiently wide and hung that light cannot enter at the sides or between rollers. Care should be taken to harmonize the colors with the color of the walls in the rooms. The color should be light tan, buff or straw. To darken rooms, opaque shades of agreeable color scheme should also be provided.

d. Accommodations for top clothing

Adequate accommodations for pupils' top clothing must be provided in every school building by providing coat rooms, wardrobes or steel lockers.

(1). Coat rooms

When coat rooms are provided, they should adjoin the school room and be placed preferably at the rear of the school room. Wardrobes may be substituted. Such coat rooms shall be not less than four feet six inches (4′ 6″) wide, and be provided with two (2) doors opening directly into the school room. An outside window is required with a glass area, when possible, of at least one (1) square foot to every ten (10) square feet of floor area. Proper fixtures shall be provided for hanging of children's outer garments and shelves, umbrella racks, et cetera built-in.

Ventilation shall be provided by placing vent outlets in coat rooms for school room air. Doors separating the coat rooms from school rooms must swing into the school room or be double acting; locks are not necessary. The bottom of the door shall

hang clear of the floor and contain a grille in the lower panel. The free area of the openings to equal the area of the vent opening. In the case of two doors, the one nearer the vent flue shall be full length and tight fitting with no grille.

(2). Wardrobes

For junior high schools, wardrobes or lockers are recommended. Wardrobes shall open directly into the school room and not into the corridor. They may be placed at the rear or on the side opposite the windows. The side location will permit greater flexibility of plan and more adjustment of interior, later. When placed on the side, the doors to the wardrobes should be equipped with blackboards. Ventilation shall be secured by placing the vent outlet in side wall of the wardrobe for school room air. The vent opening shall be located at the floor line, and the doors hung not less than four (4) inches clear of the floor. The free area under the doors to equal the free area of vent outlet. In vanishing or disappearing door type wardrobes, the end doors shall have in addition, a grille in the lower panel. Proper fixtures, shelving and umbrella racks shall be provided for accommodation of outer garments. Lockers when used must be placed in recesses along corridor walls, opening into corridor.

(3). Lockers

For senior high schools, lockers are recommended. Such lockers shall be built in the walls of the corridor in recesses, or in special corridor alcoves, and corridor widths regulated to provide for this equipment. The minimum width of corridors may not be reduced because of the location of such lockers (General Requirements Section II-2-(c) *Corridors*). Separate locker rooms are not recommended. Lockers shall be steel, at least twelve (12) inches wide, twelve (12) inches deep and sixty (60) inches high. Ventilation of the exhaust type should be provided, connected directly to the lockers, ventilating corridor through them.

e. Decoration

(1). Color scheme

A cheerful surrounding should be created by use of a general color scheme. Color should be used in a manner to obtain reflection with a maximum of diffusion. Glare from any source must be avoided. Woodwork, furniture, floors and shades should harmonize in tone; special color finishes on woodwork are to be discouraged. Dull, flat finish is preferable instead of bright gloss finish for all work.
Colors recommended for rooms (numbers indicate color schemes):

Ceiling—1. Ivory white, 2. Pearl gray, 3. Ivory.

Side Walls—1. Light buff, 2. Bright sage and Ivory tan, 3. Silver gray and Caen stone.

Dado Base—1. Cocoanut brown, 2. Forest green, 3. Buff stone and pale Azure.

Warm colors in rooms with northern exposures and cool colors in rooms with southern exposures.

Woodwork, floors and furniture should have a moderate dark stain, dull finish.

(2). Display of United States Flag within school

School Code, Article VI, Section 629 requires the display of the United States national flag, not less than three feet in length, within all school buildings during each day schools are in session. The board of school directors is instructed to make rules and necessary regulations for the care and keeping of such flags, and directed to pay for all expense in connection therewith.

f. Artificial illumination

(1). Types

Electricity for the entire building is desirable. Source of supply sufficient to insure continuity of service and steadiness of light. Gas for stairways, corridors and exits is permissible.

(2). Electric wiring

All new buildings should be provided with facilities for expansion of the electric system during the normal life of the structure. The following requirements will provide adequate wiring capacity and a reasonably low voltage drop on general lighting circuits.

School Rooms, except as specified below shall be provided with one branch circuit for each four hundred (400) square feet or less for working space.

Art, Drawing, Etc., one circuit for each two hundred (200) square feet.

Auditoriums, Etc., one circuit for each six hundred (600) square feet.

Stairs and Corridors, one circuit for each six hundred (600) square feet.

A separate circuit should be provided for convenience outlets. A minimum of No. 12 wire shall be used for all branch circuits. All wiring should be in conduit.

(3). *Outlets and Adjustment*

a. Outlets

Six electric ceiling outlets and at least one double convenience outlet should be installed in each standard size class room. Rooms of larger size should have lighting increased in proportion. Use symmetrical spacing to secure even distribution of light over work space.

Corridors—twenty (20) to twenty-five (25) feet apart.

Spacing between luminaries (fixtures) not to exceed one and one-half times the mounting height. *Vestibules*—well lighted —ceiling, side-wall or cove lighting.

b. Adjustment

Spacing of outlets important, determined by structural and decorative features. Ceiling height regulates maximum spacing. Spacing of ten to twelve feet for a ceiling height of twelve feet.

Mounting height—When spaced less than maximum distance (ceiling height), should be dropped from ceiling for appearance, ease of cleaning, et cetera. Place high enough not to shine in the eyes of pupils and to minimize glare. For a spacing of ten to twelve feet, units should not be less than ten feet (mounting height) from floor.

Control switches—Located at knob side of entries, flush tumbler or push switches in rooms under direct supervision. Flush push lock switches, corridors, stairways, vestibules, toilet rooms and other public or general rooms. Key, straight through or pull sockets are desirable in shops, drawing rooms, et cetera and in layouts requiring special applications. Ceiling outlets in class rooms should be controlled by two switches; each row of three controlled by an individual switch. When switches are arranged side by side (horizontally) they should be grouped in gangs; when end to end (vertically) they should be in tandem and one flush plate should be used to cover all.

(4). Standards of Illumination

The foot candle values given below correspond to present standards for artificial illumination and are merely an index to good practice.

Rooms	*Recommended*	*Minimum*
Regular rooms, class rooms	12	8
Special rooms, library, laboratories, shops, offices	12	8
Art, drawing, sewing, finishing rooms, etc.	25	15
Auditorium	8	5
Gymnasium floor (Physical Education)	12	8
Basket ball floor	15	10
Shower and locker rooms	6	4
Swimming pool	8	5
Corridors, stairways, passageways	3	2
Washrooms, toilets, locker spaces, dressing rooms	3	2
Boiler rooms, power plants and auxiliary spaces	3	2
Storage rooms, spaces not used by pupils	2	1
Outdoor playgrounds, if used at night	2	½
Outdoor game courts, night baseball, basketball, tennis, etc.	10	5
Walks, drives, etc., if used at night	½	¼

(5). System and Luminaries (fixtures)

a. Individual characteristics of the room to be lighted are important factors in selection of a system of lighting. Atmospheric conditions, presence of dust in air, influence of interior finish (decorative appearance), location of lighting units, reflector characteristics, general appearance and harmonius relation with the decorative or architectural features of the surroundings must be borne in mind when making the selection.

Semi-indirect or indirect lighting with their proper luminaries and lamp sizes are satisfactory systems for school room installations.

Direct lighting systems are adaptable for use in gymnasiums and layouts for special applications.

b. The lighting source should be enclosed or covered from view, glare from unit avoided, shadows soft or graded. The luminaries or fixtures should be simple in design, well proportioned, and be in a harmonious relation with the decorative or architectural features of the surroundings. The primary purpose of the luminary is to provide light of sufficient quality and quantity to meet the visual requirements. The luminary should have a diameter in proportion to lamp size required. The contour of unit and quality of material should be carefully considered to secure maximum efficiency of luminary and lamp.

(6). Maintenance

Adequate maintenance of the entire system should be provided so that maximum efficiency is always secured. This service to include systematic inspection, cleaning, and replacement of equipment (burnt out lamps, et cetera).

g. Equipment

(1) Seating

Individual, permanently fastened seating is recommended, adjustable seats and desks, arranged in graded sizes. Movable furniture is desirable in one teacher schools, lower grades of elementary schools and in some sections of the high school organization. The type of organization and local needs govern this problem. Double seats should not be used and are not recommended. Comfortable seating should be provided for every pupil.

(2). Teacher's desk

A strong, substantial, attractive desk is required. It should be adequate to meet the needs, be of appropriate size, raised slightly from floor to facilitate cleaning underneath, and finished to harmonize with general color scheme of room and other furniture.

(3). General equipment

All rooms should be adequately equipped for the efficient, proper functioning of the service to be rendered by the occupants.

To realize most on the investment, the following mentioned bulletins and pamphlets distributed by the Department of Public Instruction, Harrisburg, Pennsylvania, should be consulted before purchasing equipment.

a. Elementary schools

Bulletin No. 32—1927, *Building and Equipment for a One Teacher School.*

Bulletin No. 45—1927, *One Teacher Elementary School Handbook of Organization and Course of Study.*

b. Secondary schools

Supervisory Pamphlet—1929, *Standards for the Classification of Secondary Schools.*

c. General

Additional equipment and services as required by local districts commensurate with needs and requirements.